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ENVIRONMENTAL CONSEQUENCES OF *QUELEA QUELEA* AND *SCHISTOCERCA GREGARIA* CONTROL PROGRAMS IN AFRICA.

KEITH, J.O.

DENVER WILDLIFE RESEARCH CENTER, USDA, Box 25266, Denver, CO 80225 USA

During the last 2 decades, considerable concern has developed over the use of certain insecticides in arid regions of Africa. Fenthion is widely used to kill quelea (*Quelea quelea*) and other weaverbirds, whose massive populations destroy crops of peasant farmers. Desert locusts (*Schistocerca gregaria*) erupt periodically throughout Sahelian Africa and can cause serious losses to crops and forage. A variety of insecticides are used in locust control programs.

Between 1985 and 1992, the Denver Wildlife Research Center cooperated with numerous organizations and individuals to evaluate environmental effects of quelea control with fenthion and locust control with fenitrothion, chlorpyrifos, dichlorvos, and malathion. Studies were made of fenthion applications both to quelea nesting colonies in savannah habitats and to weaverbird roosts in wetlands. Deposits and spray drift were determined. Fenthion killed many nontarget birds; cholinesterase measurements and residues in ingested foods were used to document exposure and cause of death. Fenthion on carcasses of dead weaverbirds was measured to depict hazards to predators and scavengers. Residues on vegetation and in water were ascertained and impacts on aquatic organisms were determined. Fenthion applications resulted in mortality of many nontarget organisms and hazardous habitat contaminations. However, these effects were short-term (5-10 days) and restricted to small areas. Raptors were affected but not killed. Elsewhere, quelea control with fenthion has killed large numbers of raptors and scavengers. Fenitrothion and chlorpyrifos were evaluated on experimental plots in savannah habitats of northern Senegal.

These insecticides have caused mortality in birds in other studies. In Senegal, bird counts, carcass searches, and cholinesterase measurements documented a low bird mortality, but considerable sublethal exposure. Two species that were breeding showed reduced reproductive success. One species deserted nests, and in another, flightless young died of either lack of food, inattention by adults, or fenthion poisoning. Malathion and dichlorvos were studied on experimental plots in a shrub steppe habitat of southern Morocco. Malathion is not highly toxic to birds and mammals, but is a potent, broad-spectrum insecticide capable of causing indirect effects by reducing insect food supplies. Dichlorvos is more toxic, but has never been evaluated in the field. Replicated treatments to plots were evaluated with bird counts, mammal trapping, insect counts and trapping, cholinesterase measurements, food habit studies and radiotracking of vertebrates, and residue analyses of soil and vegetation. Neither insecticide was found to cause severe or prolonged effects on either vertebrates or invertebrates. However, diverse evidence suggested most applications resulted in poor deposits of insecticides on plots, due probably to adverse weather conditions.